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before. The Western Grebe is a much larger bird than any of the other grebes which occur in Kansas. Dr. Cooper, who has studied this grebe on the Pacific coast, remarks that it greatly resembles the loon in its habits. It can dive and swim under the water with the greatest ease, and when once risen above the surface, can fly with rapidity. It is described as being a fine-looking bird as it sits on the water, riding very lightly, its long neck erect, and its bill pointing horizontally forward. Its length of neck makes the motion during the act of diving a very peculiar one. When it flies, both its feet and neck are outstretched. The colors of certain parts which are very beautiful in life, change and fade after death.

3. The third addition to our avi-fauna is Clark's Nutcracker, *Picicorvus columbianus* Wilson. The capture of a specimen of this bird was reported to me on August 13, 1888, by Mr. L. L. Jewell, of Irving. The specimen was shot on August 12, near the south line of Marshall county, by Mr. Chas. Metz. The wings and tail were forwarded to me for identification. Mr. Jewell states that the bird had breakfasted upon a variety of seeds, not including those of the pine cone, showing that the species is capable of doing entirely without that article of food which predominates in its mountain diet.

On the 1st of October, Dr. Louis Watson, of Ellis, who has made so many contributions to our knowledge of the Kansas bird fauna, wrote to me announcing that he had certainly seen two Clark's Nutcrackers together in a narrow strip of timber on his farm. He says: "They were not wild, as I repeatedly saw them within five or six rods. I returned to the house for my gun, but did not find them in that portion of the timber through which I could drive. I am very sorry that I did not get a specimen for you. They were of a grayish color, bill rather long, and in their short flights showed a broad white stripe across the wing, and in the much-expanded tail much white exterior to a white center. There can be no doubt but the birds were *Picicorvus columbianus*, of Wilson."

I can find no record of the previous occurrence of the bird at any point east of the Rocky Mountains. The fact of its appearance in both Marshall and Ellis counties on dates more than six weeks apart, considered in connection with the well-known gregarious character of the species, indicates the probability that it entered the State in considerable numbers. This is certainly a remarkable instance of separation from natural habitat. Dr. Coues states that the range of this species is nearly coincident with that of coniferous vegetation in the West. It rarely descends below an altitude of 3000 feet above the base of the mountains, and has been observed on peaks 10,000 feet high. The omnivorous character of the bird, however, seems to give it the power of adapting itself to a new habitat. Dr. Coues states that it is an indiscriminate feeder upon vegetable substances, giving preference to the seeds of the pine, berries of the cedar, and acorns. Mr. T. M. Trippe states that it occasionally visits the slaughter-houses, and like a true crow, seems to be quite omnivorous, cramming its hungry maw with everything that will satisfy its voracious appetite.

A LIST OF THE KANSAS SPECIES OF PERONOSPORACEAE.

BY W. T. SWINGLE,

Assistant Botanist Kansas Experiment Station, Manhattan, Kansas.

This list has been prepared with the following objects in view: First, to include all species known to occur within the State. Second, to attempt to show something of the phænology of the species, though unfortunately, Kansas species have not been observed long enough to give results of much value in this line. It has been thought best to give a list of all the specimens collected in the State, which by their number indicate something of the relative abundance of the species. Third, to give the results of an examination of all the specimens for oospores. If no mention of oospores is made immediately after the number of the specimen, it is to be understood that the specimen was examined but none were found. Fourth, to give the classification used by Schrœter in Cohn's Kryptogamen-Flora Schleseins, III Band., and adopted by Berlese and DeToni in Saccardo's Sylloge Fungorum, Vol. VII. Since I know of no American publication giving this classification, I have given descriptions of the family, genera and sub-genera, for the most part simply translations from Sylloge and Krypt. Flora. I have also included the extra limital genus *Phytophthora*, as it is very probable that it will soon be known in the State.

It will be noticed at once that several familiar names have been changed by this classification, and that I have made a few innovations myself. It is hoped that the reasons for the change given in each case will prove satisfactory. Two new species, *Peronospora Hedeomæ*, Kell. & Sw., and *Per. Cynoglossi*, Burrill, and one new variety *P. Cynoglossi*, Burrill, var. *Echinospermi* Swingle, are described.

It has not been found practicable to give any notes on the relation of the growth of *Peronosporaceæ* to the humidity of the atmosphere, though several facts of interest have been noticed. One point, however, may receive mention, as it has been scarcely regarded by other writers on this group. That is the wintering of *Peronosporaceæ* in young plants. It has been noticed for several years that some of the species could be found very late in fall and early in spring, or even during mild weather in winter on seedling plants. Sections through these affected plants showed an apparently healthy mycelium, even during the coldest weather. It requires but a few days of warm weather to produce a crop of conidia. It was also noticed that such parisitism was very destructive to the host plants, a very large per cent. dying in early spring.

Only the following species (all of the genus *Peronospora*, it will be noticed) have been found passing the winter in seedling plants: *Peronospora Arenariæ*, var. *macrospora*, *P. Arthuri*, *P. Corydalis*, *P. parasitica* and *P. Hedeomæ*.

All of the thirty-two species included in this list were collected from August, 1883, to October, 1889, by Prof. W. A. Kellerman or myself, unless otherwise specified. The numbers given, unless preceded by the name of some collector, should be cited: Kellerman and Swingle.

The species are arranged in the genera, or sub-genera, according to the host plants — following Bentham and Hooker's Genera Plantarum.

In all cases the original descriptions have been cited, and the more important synonyms given. I have also given, in brackets following these citations, the references to American descriptions, and to Saccardo's Sylloge.

All of the specimens of any species collected on one plant are given immediately after its name, and arranged according to the time of the year the collection was made. These references to specimens give the number, date, and locality, and also tell the part of the plant attacked.

All of the numbers mentioned in this list are in my herbarium, and also that of Prof. Kellerman. All of the species are in the herbarium of the Kansas State Agricultural College.

In conclusion, I thank Prof. W. A. Kellerman for the use of his books and collections, without which the list in its present form would not have been possible. To Mr. J. B. Ellis, Dr. B. D. Halsted, Dr. T. J. Burrill, Prof. W. G. Farlow, Mr. W. C. Stevenson, jr., Prof. M. A. Carleton, Mr. E. Bartholomew, and Miss May Varney, I owe thanks for many favors.

I give in conclusion a list of writings and exsiccate containing references to Kansas species.

BIBLIOGRAPHY OF WORKS REFERRING TO KANSAS PERONOSPORACEAE.

(*a*) WRITINGS.

I. A Partial List of the Kansas Parasitic Fungi, together with their Host Plants, by W. A. Kellerman, Ph. D. In Trans. of 16th and 17th Ann. Meetings Kansas Acad. Sci., vol. IX (1883–1884), pp. 79–86. (1885.) (Reprinted in Bulletin No. 2 of the Washburn College Lab. of Nat. Hist., January, 1885, pp. 72–81.)

Includes (p. 83) 11 species on 15 host plants.

II. New Kansas Fungi, by J. B. Ellis and W. A. Kellerman. In Journal of Mycology, vol. I, pp. 2–4. (1885.)

Describes (p. 2) *Peronospora Oxybaphi*, E. & K.

III. Second List of Kansas Parasitic Fungi, together with their Host Plants, by W. A. Kellerman, Ph. D., and M. A. Carleton. In Trans. of 18th and 19th Ann. Meetings Kansas Acad. Sci., vol. X (1885–1886), pp. 88–99. (1887.)

Includes (pp. 94 and 95) 14 species on 22 host plants; includes those given in I and II.

IV. New Kansas Fungi, by J. B. Ellis and W. A. Kellerman. In Journal of Mycology, vol. III, pp. 102–105. (1887.)

Describes (p. 104) *Peronospora Swinglei*, E. & K.

V. New Species of Fungi from Kansas, by J. B. Ellis and W. A. Kellerman. In Journal of Mycology, vol. III, pp. 126, 127.) (1887.)

Describes (p. 126) *Peronospora Lini*, E. & K.

VI. Notes on Fungi from Western Kansas, U. S. A., by W. T. Swingle. In Journal of Mycology, vol. IV, pp. 27–29. (1888.)

Includes (p. 29) one species "*Peronospora Effusa* (Grev.), on *Chenopodium album* L., Cloud county, Kas.," collected by M. A. Carleton.

VII. Sylloge Fungorum Omnium hucusque cognitorum, digissit P. A. Saccardo, VII. (Pars. I.) Phycomyceteae auctoribus, Doct. A. N. Berlese et J. B. De Toni, *Peronosporaceae*, pp. 233–264. (1888.)

Includes descriptions of all species, and Kansas is given as locality for *Peronospora Oxybaphi*, E. & K.

VIII. Report of the Department of Agriculture for the year 1888. Report of the chief of the Section of Vegetable Pathology, pp. 325–404, by B. T. Galloway.

A map at the end of the report, showing the distribution and severity of the Potato Rot, shows the disease to be reported from Kansas and destroying 0–7 per cent. of the crop.

(*b*) EXSICCATÆ.

IX. J. B. Ellis, North American Fungi, and J. B. Ellis and B. J. Everhart, North American Fungi, second series.

X. Robenhorst-Winter, Fungi Europæi.

XI. C. Romeguere, Fungi Gallici Exsiccati, and Fungi Selecti Exsiccati.

XII. Kellerman and Swingle, Kansas Fungi.

Fam. **PERONOSPORACEAE** De Bary.

(*Peronosporeae.*)

Hyphae commonly branched, conidia mostly producing zoospores, sometimes germinating directly; reproduction both asexual by conidia and sexual by oogonia and antheridia. Air-loving fungi, parasitic on living plants — mostly found on leaves. [Sacc. Syll. vol. VII., pp. 182 and 233.]

ANALYTICAL KEY TO THE GENERA.

A) Conidiophores short, produced inside of the host. Conidia catenulate.

1. *Cystopus*. Conidia and oospores producing zoospores.

B) Conidiophores arising from the host through fissures. Conidia solilary.

† Conidiophores sparingly branched, at first producing conidia acrogenously, then also on the sides.

Phytophthora. Conidia producing zoospores.

†† Conidia always acrogenous.

§ Conidiophores with rather short, obtuse terminal branches. Conidia never germinating directly, but by zoospores or by discharging the whole protoplasm.

Sclerospora. Wall of oospore thick. Germination by zoospores.

Plasmopara. Wall of oospore thin. Conidia producing zoospores or discharging (before germination) the whole protoplasm.

§§ Conidiophores many times dichotomously branched, terminal branches subulate uncinate. Conidia germinating directly.

Bremia. Haustoria not branched. Conidia germinating through an apical papilla.

Peronospora. Haustoria branched, conidia destitute of an apical papilla, germinating laterally.

CYSTOPUS Leveille, in Ann. Sci. Nat., ser. 3, t. VIII, p. 371. [Bull. Bussey Inst., vol. I, p. 429. Bot. Gaz., vol. VIII, p. 334. Syll., vol. VII, p. 233.]

Conidiophores simple, smooth, cylindrical, or clavate, very obtuse, arising as branches from the mycelium and collected in large numbers in cushion-shaped sori, bearing a single apical moniliform series of conidia. Sori at first covered by the epidermis of the host plant, then bursting open the epidermis and scattering the mature conidia, either white or yellowish. Conidia either all of the same form, hyaline, generating zoospores, or of two forms, mostly hyaline and producing zoospores, but with a few at the ends of the chains with a thicker, often lutescent wall, either germinating by a simple tube or sterile. Oospores globose, epispore mostly reticulate or warty.

§ I. Exosporium thick, plainly four-layered; conidia globose or rounded quadrate (short cylindrical).*

1. **Cystopus candidus** (Pers.) Lev., in Ann. Sci. Nat., ser. 3, t. VIII, (1847) p. 371, UREDO (ALBUGO) CANDIDA, Pers. Synops. Meth. Fung., p. 223. [Bull. Bussey Inst., vol. I, p. 429. Bot. Gaz., vol. VIII, p. 334. Syll., vol. VII, p. 234, No. 792.]

Conidia and oospores on leaves, stems and inflorescences of *Cruciferae* March to August, most common April and May.

On *Draba Caroliniana* Walt.

1512, with immature oospores, on leaves, May 1, 1888, Manhattan. (*Peronospora parasitica*, No. 1512*a*, occurs on the lower leaves of the same plants.)

On *Sisymbrium canescens* Nutt.

1580, on leaves, March 26, 1889, Manhattan; 1616, on leaves, March 29, 1889, Manhattan; 1537, on leaves, April 4, 1889, Manhattan; 1596, on leaves, April 22, 1888, Manhattan; 1533, on leaves, April 25, 1889, Manhattan (*Peronospora parasitica* No. 1533*a* occurs on leaves and stems of the same plants); 1516, on leaves, May 4, 1885, Manhattan; E. Bartholomew No. 294, on leaves, with very young oospores, May 27, 1889, Rooks county.

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* Zalewski Zur Kenntniss der Gattung Cystopus, Lev., in Botanisches Centralblatt, Band XV, (1883) No. 7 (33), S. 222.

On *Sisymbrium officinale* Scop.

1599, on leaves, June 18, 1889, Manhattan; 1657, on leaves, July 3, 1889, Manhattan; 1530, on leaves, July 30, 1887, Lawrence.

On *Nasturtium Armoracia* Fries.

1517, on leaves, May 20, 1885, Manhattan; 1504, on leaves, 1883; 1631, on leaves, June 29, 1889, Manhattan (a *Septoria* occurs on the upper side of the spots caused by the *Cystopus*); 446, on leaves, August 10, 1883, Manhattan.

On *Nasturtium sessiliflorum* Nutt.

M. A. Carleton No. 102, on leaves, May 18, 1888, Cloud county; 1521, on leaves, May 22, 1887, Manhattan; 1503, on leaves, May 31, 1884, Zeandale, Riley county.

On *Capsella Bursa-pastoris* Moench.

1506, on stems, pedicels, and seed-pods, May 20, 1886, Manhattan; 1538, on stems, pedicels, and seed-pods, June 6, 1889, Manhattan.

On *Brassica Nigra* Koch.

1650, with very abundant mature oospores in the ends of the stems and pedicels, and even flowers, causing considerable distortion, no conidia, July 4, 1889, Manhattan.

On *Lepidium intermedium* Gr.

1536, on leaves, April 4, 1889, Manhattan; 1518, on leaves, April 5, 1888, Manhattan; 1529, on leaves, April 5, 1889, Manhattan; 1665, on leaves, April 6, 1889, Manhattan; 1534, with mature oospores, on leaves, April 25, 1889, Manhattan; E. Bartholomew, No. 293, with young oospores, on leaves, May 27, 1889, Rooks county (*Peronospora parasitica*, No. 293*a*, also occurs on the same plants); 1522, with mature oospores, on leaves, June 1, 1887, Manhattan.

On *Lepidium Virginicum* L.

1505, with young oospores (?), on leaves, May 4, 1884, Manhattan.

On *Raphanus sativus* L. (cult. Radish).

446*a*, on leaves, May 30, 1885, Manhattan.

2. **Cystopus Ipomoeae-panduranae** (Schw.) Stevs. & Sw. ÆCIDIUM IPOMOEAE-PANDURANAE, Schw. Syn. Fung. Carol., No. 454. CAEOMA (ÆCIDIUM) CONVOLVULATUM, Schw. Syn. Fung. Am. Bor., p. 292, No. 2866. CYSTOPUS CONVOLVULACEARUM, Otth. sec. Zalewski in Bot. Centralb., XV Band, (1883) S. 223. CYSTOPUS CONVOLVULI, Otth. (?). CYSTOPUS CONVOLVULACEARUM, Speg. (?) Fungi Guarantici, Pug. I, No. 163. CYSTOPUS CUBICUS, Auct., p. p.

   Conidia on leaves, petioles, stems, and calyces, and oospores only in stems,* of *Convolvulaceae* June to September; most abundant during July and August.

On *Ipomoea hederacea* Jacq.

1507, on leaves, June 11, 1886, Manhattan; 1635, on leaves, July 18, 1887, Mound City; 1792, on leaves and stems, August 1, 1889, Manhattan; 1539, on leaves, August 15, 1887, Manhattan; 1540, on leaves, August, 1886, Manhattan; 1669, on leaves, stems, and flowers, August 18, 1889, Stockdale, Riley county; 1520, (Coll. D. G. Fairchild,) on calyces and leaves, September 6, 1887, Manhattan; 1879, with a few mature oospores on stem just below calyx, September 28, 1889, Manhattan.

On *Ipomoea lacunosa* L.

1765, on leaves, August 28, 1889, Manhattan.

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* Dr. B. D. Halsted sends me specimens collected on Ipomoea pandurata at Millstown, N. J., Sept. 3, 1889, which have many oospores in the leaf spots, and in swellings of the petiole.

On *Ipomoea leptophylla* Torr.

642, conidia on leaves and stems, oospores abundant in stems, August 20, 1884, Garden City, Finney county.

On *Ipomoea pandurata* Meyer.

1008, conidia on leaves, petioles, and stems, oospores only in stems, mature mature, July 18, 1887, Mound City.

Mr. W. C. Stevenson, jr., of Philadelphia, has compared Kansas specimens with the original specimen of *Æcidium Ipomomeae-panduranae* in the Schweinitzian Herbarium, and pronounces the conidia and oospores identical in both. The oospores of this species are very different from those of *Cystopus Trapopogonis*, to which it has been referred by many writers. They are sub-globose or slightly oval, yellow or yellowish brown, about 40–50μ diam., with a very thick (about 5–8μ) wall; epispore thick, colored, marked with thick, blunt, rather sparse tubercules; oogonia rather closely fitting the oospores, about 50–65μ diam., hyaline, with irregular, abundantly sinuose-tuberculate ridges, or folds.

The epispore often comes off the oospore and remains in the oogonium when it is crushed. When wanting the epispore, the oospores are seen to be hyaline, and to have a thick inner wall. The antheridia can be plainly seen, even in mature specimens, attached to the outside of the oogonia, and connected with the oospores by a thick, short, colored tube.

A few oospores were seen which seemed to be abortive. Instead of containing a single large oospore, the oogonium contained several small thick-walled yellow spheres.

3. **Cystopus Portulacae** (DC.) Lev., in Ann. Sci. Nat., ser. 3, t. VIII (1847), p. 371. UREDO PORTULACAE DC. Fl. Franc., vol. II, p. 88; vol. VI, p. 68. [Bot. Gaz., vol. VIII, p. 336; Syll., vol. VII, p. 235, No. 795.]

Conidia and oospores on leaves and capsules of *Portulacaceae* June to October; most abundant in July and August.

On *Portulacea oleracea* L.

1601, June 21, 1889, Manhattan; 1509, July 20, 1886, Manhattan; 1767, on leaves, July 27, 1889, Manhattan; M. A. Carleton No. 161, with mature oospores, July, 1886, Cloud county; 1515, August 21, 1885, Kinsley, Edwards county; 418, August 31, 1883, Manhattan; 1895, on leaves and capsules, with mature oospores, October 15, 1889, Manhattan.

4. **Cystopus Trapopogonis** (Pers.) Schroeter, in Cohn. Krypt. Flor. Schles., III Band S. 234, No. 348. *Uredo candida* Pers., var. B. UREDO TRAPOPOGI Pers. Syn. Meth. Fung., p. 223. CYSTOPUS CUBICUS (Strauss) Lev., in Ann. Sci. Nat., ser. 3, t. VIII. UREDO CUBICA Strauss, in Ann. Wetterauer Ges. f. Naturk., vol. II, p. 86; pl. 2, f. 3. [Bull. Bussey Inst., vol. I, p. 429; Bot. Gaz., vol. VIII, p. 335; Syll., vol. VII, p. 234, No. 793.]

Conidia and oospores on leaves, stems and inflorescence of *Compositae Tubuliflorae* June to August, most abundant June and July.

On *Iva ciliata* Willd.

M. A. Carleton No. 158, on leaves and sparingly on inflorescence, August 20, 1886, Cloud county.

On *Ambrosia artemisiaefolia* L.

1587, on leaves, June 6, 1889, Manhattan; 1593, on leaves, June 9, 1889, Manhattan; 1167, on leaves, June, 1887, Manhattan; 1764, oospores and conidia on leaves, July 30, 1889.

On *Ambrosia psilostachya* DC.

E. Bartholomew No. 347, on leaves, oospores mature, July 27, 1889, Rooks county; M. A. Carleton No. 159, on leaves, stems, and inflorescence, oospores abundant and mature, August, 1886, Cloud county; 1785, oospores and a few conidia on leaves, August 18, 1889, Manhattan.

On *Ambrosia trifida* L.

1168, on leaves, June 9, 1887, Manhattan.

5. **Cystopus Amaranti** (Schw.) Berkeley, Notices of N. A. Fungi, No. 571 in Grev., vol. III, p. 58. CÆOMA (UREDO) AMARANTHI Schw. Syn. Fung. Am. Bor., p. 292, No. 2853. CYSTOPUS AMARANTACEARUM Zalewski, in Bot. Centralb., XV Band, S. 223. CYSTOPUS BLITI, Auct. p. p. [Bull. Bussey Inst., vol. I, p. 429; Bot. Gaz., vol. VIII, p. 335; Syll., vol. VII, p. 235, No. 797.]

Conidia and oospores on leaves of *Amarantaceae* May to September, most abundant June and July.

On *Amarantus albus* L.

1605, June 9, 1889, Manhattan.

On *Amarantus blitoides* Wats.

1602, May 26, 1889, Manhattan; 1592, June 8, 1889, Manhattan; 1603, June 10, 1889. Manhattan.

On *Amarantus retroflexus* L.

1589, June 10, 1889, Manhattan; M. A. Carleton No. 160, June 11, 1886, Cloud county; 1541, June 15, 1886, Manhattan; 1622, oospores abundant, mature, June 29, 1889, Manhattan; 962, oospores mature and very abundant, conidia very scarce, July 8, 1887, Manhattan; 1511, oospores mature, abundant, conidia wanting, July 8, 1887, Manhattan; 962*a*, oospores mature, conidia very scarce, July 9, 1887, Manhattan; 1514, July 18, 1887, Mound City, Linn county; 1769, July 27, 1889, Manhattan; 426, July 31, 1883, Manhattan; 1660, August 2, 1883, Manhattan; 1874, with mature oospores, September 8, 1889, Manhattan.

I have followed Zalewski* in separating this species from *Cystopus Bliti* (Biv.) De Bary.

PHYTOPHTHORA De Bary. Researches into the Nature of the Potato Fungus, in Journ. Roy. Ag. Soc., second series, vol. XII (1876), pp. 239–269. [Bot. Gaz., vol. VIII, p. 309; Syll., vol. VII, p. 237.]

Mycelium growing in and killing the cells of the host, furnished with but few if any haustoria; conidiophores usually sparingly branched. Conidia at first acrogenous, then produced on the sides of the conidiophores; ovate, papillate at the apex, producing zoospores. Oospores globose, epispore rather smooth, brown.

Phytophthora infestans (Mont.) De Bary, Researches into the Nature of the Potato Fungus, in Journ. Roy. Ag. Soc., second series, vol. XII (1876), pp. 239–269. BOTRYTIS INFESTANS Mont. Mem. l' Inst., 1845, p. 113; Syll., p. 302. [Bull. Bussey Inst, vol. I, p. 426; Bot. Gaz., vol. VIII, p. 309; Syll., vol. VII, p. 237, No. 802.]

This species, the cause of "Potato Rot," has not, to my knowledge, been collected within the limits of Kansas by any mycologist. It is, however, reported from Iowa,† and in the Annual Rep. of the Dept. of Agriculture for 1888: Rep. of the Chief of the Sec. of Veg. Path. A map showing the distribution of the

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* Bot. Centralbl. l. c.

† Bull. from the Bot. Dept. of the Iowa Ag. Coll., 1886; Bull. No. 1 from the Lab. of Nat. Hist. of the State Univ. of Iowa (1888).

"Potato Rot" reports its occurrence in the southern and northern portions of Kansas. It also gives the potato crop as injured to the extent of 0 to 7 per cent. by the Rot. It is therefore very probable that this species occurs in the State.

SCLEROSPORA Schroeter, in Cohn Krypt. Flora Schles., III Band, S. 236. PERONOSPORA Subg. SCLEROSPORA Schroeter. In Hedw., vol. VIII (1879), pp. 83-87. [Syll., vol. VII, p. 238.]

Conidiophores erect, furnished with few branches; conidia ovate, emitting the zoospores through an apical papilla. Oospores globose, with a very thick, many-layered, brown, epispore.

6. **Sclerospora graminicola** (Sacc.) Schroeter, in Cohn. Krypt. Flora Schles., III Band, S. 236, No. 352. PROTOMYCES GRAMINICOLA Sacc. Fungi Veneti Novi vel Critici, ser. V., No. 91, in Nuovo Gior. Bot. Ital., vol. VIII (1876), p. 172; Mycothecia Veneta No. 496. USTILAGO (?) URBANI Magnus, in Verhandl. der Bot. Ver. der Provinz Brandenburg, 1878, p. 52. PERONOSPORA SETARIA Passerini, in Grevillea, vol. VII (1878), p. 99. PERONOSPORA GRAMINICOLA Saccardo, in Michelia, No. VIII, p. 586. [Bot. Gaz., vol. IX, p. 39; Syll., vol. VII, p. 238, No. 804.]

Oospores and conidia (?) on leaves and inflorescence of *Gramineae* August.

On *Setaria Italica* L. (New Golden Wonder Millet.)

1772, oospores alone, on leaves and inflorescences, August 17, 1889, Manhattan; 1871, oospores and seemingly a few conidia, though no conidiophores could be seen, on leaves and inflorescence, August 24, 1889, Manhattan.

On *Setaria Italica* Kth., var. *Germanica.* (Hungarian Grass.)

1872, oospores only, on leaves and inflorescence, August 24, 1889, Manhattan.

This species did considerable damage to a plot of New Golden Wonder Millet and some Hungarian Grass mixed with it, on the Kan. State Ag. Coll. farm.

PLASMOPARA Schroeter, in Cohn. Krypt. Flor. Schles., III Band, S. 236. [Syll., vol. VII, p. 239.] BASIDIOPHORA Roze & Cornu. GILLETIA Sacc. & Penz. PERONOSPORA § ZOOSPORIPARAE and § PLASMATOPARAE De Bary.

Mycelium thick, furnished with minute, simple vesiculose or ovate haustoria; conidiophores erect, sparingly [usually pinnately,] branched; conidia mostly papillate; oospores globose, epispore, light brown, smooth.

7. **Plasmopara Geranii** (Peck) Berl. & De Toni, in Sacc. Syll., vol. VII, p. 242, No. 811. PERONOSPORA GERANII Peck. 28th Rep. N. Y. State Mus., p. 63. PERONOSPORA NIVEA Ung., var. GERANII Farlow, in Bull. Bussey Inst., vol. I, p. 426; [Bot. Gaz., vol. VIII, p. 311.]

On leaves of *Geraniaceae* May.

On *Geranium Carolinianum* L.

M. A. Carleton No. 97, May 11, 1888, Wichita, Sedgwick county.

8. **Plasmopara viticola** (B. & C.) Berl. & De Toni, in Sacc. Syll., vol. VII, p. 239, No. 806. PERONOSPORA VITICOLA B. & C. Grev., vol. III, p. 109. PERONOSPORA VITICOLA (B. & C.) De By. Ann. Sci. Nat., ser. 4, t. XX, p. 165. BOTRYTIS VITICOLA B. & C. (name only). [Bull. Bussey Inst., vol. I, p. 427; Bot. Gaz., vol. VIII, p. 309.]

On stems and leaves of *Ampelidaceae* June to October, most abundant from July to October, rather common.

On "Pearl" grape (*Vitis sp. cult.*).

460, on leaves, August 16, 1883, Manhattan.

On *Vitis riparia* Mx.

1528, on leaves and stems, June 10, 1886, Manhattan; 1569, on leaves, July 7, 1887, Mound City, Linn county; 1800, on leaves, September 1, 1889, Manhattan; 678, on leaves, October 4, 1884, Manhattan (*Phoma ustulatum* B. & C. also occurs on the same leaves); M. A. Carleton No. 38, on leaves, October 9, 1887, Cloud county.

NOTE.—During the last week of August, 1889, the experimental vineyard of the Kansas State Agricultural College, at Manhattan, was examined for *Plasmopara viticola*. Thinking that the result might be of value as showing which varieties were most affected,* I have given the horticultural name of the variety, the species from which it is derived, according to the "Bushberg Catalogue" for 1883, and also the estimated damage on a scale of 100, in figures immediately following the name of the variety.

Varieties derived from *Vitis æstivalis* Mx. On leaves.

1808. *Eumelan* (15). August 31.
1807. *Lenoir* (10). August 31.

Varieties derived from *Vitis Labrusca* L. On leaves.

1838. *Catawba* (20). August 29.
1837. *Concord* (20). August 29.
1831. *Cottage* (15). August 31.
1835. *Creveling* (30). August 29.
1836. *Diana* (30). August 29.
1834. *Dracut Amber* (8). August 29.
1832. *Eaton's Seedling* (20). August 31.
1833. *Early Victor* (8). August 29.
1813. *Hartford Prolific* (2), oospores mature, scarce. August 31.
1816. *Iona* (10), oospores immature. August 31.
1817. *Isabella* (10), oospores mature, very scarce. August 31.
1814. *Ives* (1), oospores scarce. August 31.
1810. *Lady* (20), oospores very scarce. August 31.
1818. *Martha* (5). August 31.
1812. *Mason's Seedling* (30). August 31.
1811. *Maxatawney* (10). August 31.
1865. *Miles* (10). August 31.
1828. *Norfolk* (8). August 31.
1820. *Perkins* (10), oospores immature. August 31.
1827. *Pocklington* (10). August 31.
1830. *Prentiss* (15), oospores mature. August 31.
1826. *Rebecca* (20). August 31.
1821. *Venango* (5), oospores nearly mature. August 31.
1825. *Vergennes* (15). August 31.
1822. *Worden's Seedling* (15). August 31.
1824. *Wyoming Red* (15). August 31.

HYBRID VARIETIES.—On leaves.

1844. *Agawam* (5). August 29.
1849. *Amber Queen* (10). August 31.
1854. *Amminia* (10). August 29.
1861. *August Giant* (5). August 29.
1843. *Beauty* (15). August 29.

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* The following varieties were not attacked by *Plasmopara:*
Bacchus.
Barry.
Clinton.
Cynthiana.
Duchess.
Elvira.
Empire State.
Gazelle.
Goethe.
Herbert.
Norton's Va.
Peter Wylie.
Swing.
Ulster's Prolific.

1839. *Black Eagle* (1). August 29.
1857. *Brant* (1), oospores mature, scarce. August 31.
1841. *Brighton* (25). August 29.
1809. *Centennial* (20). August 31.
1863. *Croton* (20), oospores nearly mature, scarce. August 29.
1842. *Delaware* (40). August 29.
1903. *Downing* (20). September 6.
1858. *El Dorado* (1). August 31.
1806. *Etta* (25). August 31.
1840. *Eva* (8). August 29.
1862. *Faith* (10). August 29.
1860. *Grein's Golden* (15). August 29.
1851. *Highland* (25). August 31.
1804. *Humboldt* (15). August 31.
1845. *Iowa Excelsior* (20). August 31.
1815. *Jefferson* (20), oospores mature, very scarce. August 31.
1802. *Marion* (20). August 31.
1855. *Massasoit* (25). August 31.
1859. *Merrimac* (1). August 31.
1805. *Montefiore* (15). August 31.
1856. *Missouri Reissling* (10), oospores very scarce. August 31.
1866. *Moyer* (25). August 31.
1853. *Naomi* (40). August 31.
1803. *Noah* (5). August 31.
1819. *Niagara* (15), oospores mature, very scarce. August 31.
1868. *Potter's Sweet* (15), oospores mature, scarce. August 31.
1801. *Pearl* (8). August 31.
1852. *Salem* (5). August 31.
1850. *Triumph* (10). August 31.
1829. *Walter* (25), oospores mature, scarce. August 31.
1848. *Wilder* (10). August 31.
1823. *Woodruff Red* (8), oospores mature, scarce. August 31.

VARIETIES OF DOUBTFUL ORIGIN.—On leaves.

1846. *Jessica* (8). August 31.
1847. *Lindly* (50). August 31.
1867. *Moore's Diamond* (25). August 31.
1864. *Rochester* (40). August 31.

9. **Plasmopara australis** (Speg.) Swingle. PERONOSPORA AUSTRALIS Speg. Fungi Argentini, Pugillus IV., p. 36, (reprinted in Trelease Prelim. List, Wisc. Par. Fungi, p. 6.) PERONOSPORA SICYICOLA Trelease in Farlow Enum. of the Per. of the U. S., in Bot. Gaz., vol. VIII, p. 331. [Syll. VII, p. 260, Nos. 870 and 871.]

Oospores and conidia on leaves of *Cucurbitaceae* June to September; most common in June and July.

On *Echinocystis lobata* T. and Gr.

1564, September 25, 1887, Manhattan; 1655, July 1, 1889, Manhattan.

On *Sicyos angulatus* L.

M. A. Carleton No. 124, June 2, 1888, Cloud county; 1615, June 15, 1884, Manhattan; 1501, oospores rather immature, very scarce. They were seen in considerable numbers in one small spot in one of the oldest leaves examined. They were nearly colorless (from immaturity?), globose, 35–40μ diam., epispore thin, apparently smooth, wall of oogonium thin, nearly smooth, closely fitting the oospore, June 20, 1884, Manhattan; 1583, June 24, 1887, Manhattan; 1656, July 1, 1889, Manhattan; July 18, 1887, Mound City, Linn county; 1766, August 6, 1889, Manhattan; 466 and 467, August 20, 1883, Manhattan; (Exs. Rabh. Wint. Fungi Europaei, No. 3276*a*, August 28, 1883, Manhattan); 1648, August 28, 1887, Manhattan; M. A. Carleton No. 162, September 16, 1884, Manhattan.

This species is undoubtedly a good *Plasmopara.* The branching of the conidiaphores is of the common pinnate type; the oospores are light-colored with a smooth exospore, and the conidia, according to Trelease,* are furnished "with an apical papilla, hence probably germinating by zoospores."

10. **Plasmopara Halstedii** (Farlow) Berl. & DeToni, in Sacc. Syll., vol. VII, p. 242, No. 810. PERONOSPORA HALSTEDII Farlow, Notes on Some Species in the Third and Eleventh Centuries of Ellis's North American Fungi, in Proc. Am. Acad. of Arts and Sci., vol. XVIII, p. 72. [Bot. Gaz., vol. VIII, p. 310.]

Oospores and conidia on leaves of *Compositae Tubuliflorae* May to August and October; most abundant May to July. Very common.

On *Vernonia Baldwinii* Torr.

543, June 5, 1884, Manhattan.

On *Eupatorium ageratoides* L. f.

1793, August 1, 1889, Manhattan.

On *Silphium integrifolium* Mx.

1591, with immature oospores, June 9, 1889, Manhattan; 1621, June 28, 1889, Manhattan; 1763, July 20, 1889, Manhattan; 525, July 23, 1886, Manhattan; (Exs. Fungi Europaei No. 3279, August, 1884, Manhattan); 606, August 5, 1884, Manhattan; 1790, August 11, 1889, Manhattan; 1768, with mature oospores, August 12, 1889, Manhattan; 1788, with a few mature oospores, August 21, 1889, Manhattan; 1898, with nearly mature oospores, September 26, 1889, Manhattan.

On *Ambrosia artemisiaefolia* L.

1559, June 2, 1887, Manhattan; 1604, June 14, 1889, Manhattan; 1627, June 30, 1887, Manhattan.

On *Ambrosia psilostachya* DC.

1641, July 2, 1889, Manhattan; 1798, July 10, 1889, Manhattan; E. Bartholomew No. 348, July 27, 1889, Rooks county; 1773, August 5, 1889, Manhattan.

On *Ambrosia trifida* L.

1594, April 23, 1889, Manhattan; M. A. Carleton No. 99, May 11, 1888, Wichita, Sedgwick county, 1526, May 26, 1886, Manhattan; 1570, May 28, 1887, Manhattan; 533, May, 1884, Manhattan; M. A. Carleton No. 99*b*, June 1, 1888, Cloud county; 1670, oospores immature, June 1, 1889, Stockdale, Riley county; 1585, June 9, 1889, Manhattan; (Exs. N. A. F. No. 1403*d*, June, 1884, Manhattan); M. A. Carleton No. 163, June 19, 1886, Cloud county; 1662, July 5, 1884, Manhattan; 1897, September 26, 1889, Manhattan.

On *Helianthus annuus* L. (Cultivated Sunflower).

1797, July 10, 1889, Manhattan.

On *Helianthus grosse-serratus* Martens.

1638, May 22, 1889, Manhattan; 1796, with a few mature oospores, May, 1889, St. George, Pottawatomie county.

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*Preliminary List of the Par. Fungi of Wisc., in Trans. Wisc. Acad. Sci. Arts and Lett., vol. VI, 1881-84.

On *Helianthus doronicoides* Lam.

522, May 25, 1884, Manhattan (Exs. Fungi Europaei No. 3278, N. A. F. No. 1403c, both collected May, 1884, Manhattan); 1524, July 27, 1886, Manhattan.

On *Helianthus tracheliifolius* Willd.

1584, August, 1886, Manhattan; 1581, October 4, 1884, Manhattan; 1900, September 26, 1889, Manhattan.

On *Bidens frondosa* L.

963, July 1, 1887, Manhattan; 1899, September 1, 1889, Manhattan.

On *Bidens connata* Muhl.

964, July 11, 1887, Manhattan.

This is probably our most abundant species. Though so common, no oospores have been found except on *Silphium integrifolium* Mx. (Nos. 1591, 1768, 1788, and 1898), and *Ambrosia trifida* L. (No. 1670).

11. **Plasmopara** *sp.* PERONOSPORA KELLERMANI Ell. & Halsted pro tem., in Ellis & Everhart North American Fungi, No. 2201.

Oospores and conidia on leaves of *Compositae Tubuliflorae* June to August.

On *Iva Xanthiifolia* Nutt.

904, June, 1887, Manhattan; (Exs. N. A. F. No. 2201, June, 1887, Manhattan); 1647, August 20, 1887, Manhattan; 1666, July 4, 1889, Manhattan; B. D. Halsted No. —, with abundant oospores in the folds or ridges, July (?), 1887, Manhattan.

This species has not yet been published, but seems to be a *Plasmopara* allied to *P. entospora*, from which it differs in having shorter fasciculate conidiophores and almost sessile conidia, which are smaller than in some forms of *P. entospora.* It is a very abundant and curious species, as yet little understood.

BREMIA Regel, in Bot. Zeit., 1843, p. 665. [Syll., vol. VII, p. 243.]

Mycelium furnished with vesiculiform or simple clavate haustoria. Conidiophores many times dichotomously branched, branches umbellate, the ultimate ones ending in a clavate or conical body from which radiate 2–8 short, subulate-conical sterigmatia. Conidia globose, depressed papillate at the apex. Oospores globose, minute; epispore slightly roughened, yellowish or dusky.

12. **Bremia Lactucae.** Regel, in Bot. Zeit. 1843, p. 665, t. 3, fig. B. PERONOSPORA GANGLIFORMIS (Berk.) DeBy. Ann. Sci. Nat., Ser. 4., t. XX, p. 108. BOTRYTIS GANGLIONIFORMIS Berk., in Journ. Hort. Soc., Lond., vol. I, p. 31, t. 4, fig. 25. [Bull. Bussey Inst., vol. I, p. 427; Bot. Gaz., vol. VIII, p. 313; Syll., vol. VII, p. 244, No. 816.]

On leaves of *Compositae Liguliflorae* May to July; most abundant May and June.

On *Lactuca Canadensis* L.

1609, May 23, 1889, Manhattan; 1500, May 25, 1885, Manhattan; 1661, June 5, 1884, Manhattan; 1623, June 23, 1889, Manhattan; 1648, July 3, 1889, Manhattan; 1902, October 23, 1889, Burlingame, Osage county.

PERONOSPORA Corda, Icones Fung., vol. I, p. 20. [Bull. Bussey Inst., vol. I, p. 426; Bot. Gaz., vol. VIII, p. 309; Syll., vol. VII, p. 244.] Mycelium furnished with filiform or branching haustoria. Conidiophores solitary or fasciculate, arising through stomata of the host plant, cylindrical, many times dichotomously branched, terminal branches mostly acute, incurved or uncinate-subulate. Conidia ovate or elliptical, destitute of an apical papilla, germinating by a lateral tube.

§ *Calothecae* DeBary. [Syll. VII, p. 245.] Oospores with a verrucose or reticulate folded epispore. Mycelium mostly furnished with round, tubular, filiform, branching haustoria.

13. **Peronospora Viciae** (Berk.) DeBary, in Ann. Sci. Nat., Ser. 4, t. XX, p. 112. Botrytis Viciae Berk., in Journ. Hort. Soc., Lond., vol. I, p. 31, t. 4, fig. 23. [Syll., vol. VII, p. 245, No. 819.]

Conidia and oospores on leaves of *Leguminosae Papilionaceae*, May and June.

On *Vicia Americana* Muhl., var. *Linearis*, Wats.

1565, (coll. by Mr. E. C. Coburn,) May 17, 1888, Zeandale, Riley county; M. A. Carleton No. 109, oospores mature, June 4, 1888, Cloud county.

14. **Peronospora Arenariae** (Berk.) Tul., in Compt. rend. Acad. des. Sci., t. XXXVIII (1854). Botrytis Arenariae Berk., in Journ. Hort. Soc., Lond., vol. I, p. 31, t. 4, fig. 22; in Ann. and Mag. Nat. Hist., Ser. 2, vol. VII.

Var. **macrospora** Farlow, in Bot. Gaz., vol. IX, p. 38.

On leaves of *Caryophylleae* November. Rare.

On *Silene antirrhina* L.

1130, on under sides of leaves of seedling plants, November 10, 1887, Manhattan.

The identification of this specimen is somewhat doubtful, as no oospores could be found. The conidiophores seemed quite different from those of *P. alsinearum*, but I had no specimens of *P. arenariae* for comparison.

15. **Peronospora Lini** Schroeter, in Bericht über die Thätigk. der bot. Sect. der Schles. Ges., J. 1865, S. 36.* Peronospora Lini E. & K., in Journal of Mycology, vol. III, p. 126.

On leaves and stems of *Lineae*, August.

On *Linum sulcatum* Riddell.

1077, August 20, 1887, Manhattan.

Since no oospores have been found in the Kansas specimens, it is not certain that *P. Lini* E. & K. is a synonym of Schroeter's species. At any rate, the name *Peronospora Lini* E. & K. cannot stand. The species seems to be very rare at Manhattan, specimens having been found but once.

16. **Peronospora Arthuri** Farlow, in Bot. Gaz., vol. VIII, p. 315. [Syll., vol. VII, p. 248, No. 826.]

On leaves of *Onagrariae* April and May and December; most common in April.

On *Œnothera biennis* L.

737, June, 1885, Manhattan; (Exs. Fungi Gallici exsiccati No. 3373, June 10, 1886, Manhattan.)

On *Œnothera sinuata* L.

1563, April 15 and 20, 1888, Manhattan; 1545, April 21, 1888, Manhattan; 1566, May 14, 1888, Manhattan; (Exs. Kansas Fungi No. 12, May 14, 1888, Manhattan); 1547, oospores just forming (?), May 16, 1888, Manhattan; 1544, May, 1888, Manhattan; 1134, December 6, 1887, Manhattan.

On *Œnothera speciosa* Nutt.

1652, July 4, 1889, Manhattan.

On *Gaura parviflora* Dougl.

M. A. Carleton No. 92, May 22, 1888, Cloud county; 1546, May 26, 1888, Manhattan.

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*According to Just. Bot. Jahresb., Jahrg. (1875) p. 179 and p. 251, where the following description is given:

Peronospora (*Calothecae*) *Lini* Schröter. Conidienträger sparrig dichotom verzweigt, Endäste pfriemlich. Conidien 18-20:13. Oosporen 22-26 Mik. Durchmesser. Epispor mit undeutlicher kleingenetzter Zeichnung.—Auf *Linum catharticum*.—Baden.

17. **Peronospora Oxybaphi** E. & K., in Journal of Mycology, vol. I, p. 2. [Syll., vol. VII, p. 248, No. 829.]

Conidia and oospores, on leaves of *Nyctagineae* May to July; most common in June.

On *Oxybaphus Nyctagineus* Sweet.

1761, May, 1886, Manhattan; 1508, May 23, 1886, Manhattan; 1614, May 23, 1889, Manhattan; 539, May 25, 1885, Manhattan; 1527, May 31, 1884, Zeandale, Riley county; 1562, June 13, 1888, Manhattan; 1619, oospores nearly mature, June 23 and 24, 1889, Manhattan; 1620, June 29, 1889, Manhattan; (Exs. N. A. F. No. 1418, June, 1884, Manhattan); 1651, July 4, 1889, Zeandale, Riley county.

The conidia of this species germinate by a lateral tube, which is short, thick, and rarely branched.

§ *Leiothecae* Schroet., in Cohn. Krypt. Flora, Schles. III., S. 243 (Parasiticae and Effusae DeBy.) [Syll., VII, p. 249.] Oospores sub-globose, epispore nearly smooth, sometimes folded. Mycelium mostly as in § *Calothecae.*

A Parasiticae wall of oogonium thick and rigid; oospore with a thin wall.

18. **Peronospora Corydalis** DeBary, in Ann. Sci. Nat., Ser. 4, t. XX, p. 107. Hedw. 1864, No. 9, p. 134. [Bot. Gaz., vol. VIII, p. 329; Syll., vol. VII, p. 329, No. 834.]

Conidia and oospores on leaves, stems, and inflorescence of *Fumariaceae*, February and April and May; most abundant in April.

On *Corydalis aurea* Willd., var. *occidentalis* Englm.

1582, on leaves, Feb. 3, 1889, Manhattan; 1575, on leaves, April 21, 1889, Manhattan; 1643, with mature oospores, on leaves and stems, April 22, 1888, Manhattan; (Exs. Kansas Fungi No. 13, with oospores, April, 1888, Manhattan); 1567, on leaves, stems and inflorescence, May 1, 1888, Manhattan; 1568, on leaves and stems, May 2, 1888, Manhattan; 517, on leaves, May 10, 1884, Manhattan; 1607, with mature oospores, on leaves and stems, May 14, 1889, Manhattan.

19. **Peronospora parasitica** (Pers.) Fries, Summa Veg. Scand., sec. pos., p. 493. BOTRYTIS PARASITICA Pers. Obs. Mycol. I, p. 96, t. 5, fig. 6. [Bull. Bussey Inst., vol. I, p. 428; Bot. Gaz., vol. VIII, p. 313; Syll., vol. VII, p. 249, No. 830.]

Conidia and oospores, on leaves, stems and inflorescence of *Cruciferae*, April to July, and December; most common May.

On *Draba Caroliniana* Walt.

1561, on leaves, April 1, 1888, Manhattan; 1513, on leaves, April 5, 1888, Manhattan; 1554, on leaves, April 22, 1888, Manhattan; 1553, on leaves, stems, and capsules, April 25, 1888, Manhattan; 1543 (coll. Miss May Varney), on stems and leaves, May 3, 1889, Manhattan; 1577, on leaves, stems, and capsules, May 9, 1888, Manhattan; 1512*a*, on lower leaves, May 9, 1888, Manhattan (*Cystopus candidus* No. 1512 also occurs on the leaves of the same plants); 511, with immature oospores, on leaves, May 10, 1884, Manhattan; 1552, on leaves, stems, and capsules, May 13, 1888, Manhattan.

On *Sisymbrium canesceus* Nutt.

1533*a*, on leaves, April 25, 1889, Manhattan (*Cystopus candidus* No. 1533 also occurs on same leaves); M. A. Carleton, No. 66, on leaves and stems, April 28, 1888, Cloud county; M. A. Carleton No. 80, on leaves, stems, and capsules, May 15, 1888, Wichita, Sedgwick county; M. A. Carleton No. 80*b*, on stems and inflorescence, May 22, 1888, Cloud county; 736, on leaves, stems, and capsules, June 5, 1884, Manhattan; 1579, on leaves, December 23, 1888, Manhattan.

On *Lepidium intermedium* Gr.

1535, on leaves, April 4, 1889, Manhattan; 1519, on leaves, April 5, 1888, Manhattan (*Cystopus candidus* No. 1518 also occurs on the same leaves); 1531, on leaves, April 5, 1889, Manhattan; 1551, on leaves, April 14, 1889, St. George, Pottawatomie county; 1532, on leaves, April 17, 1889, Manhattan; 1611, on leaves and stems, May 29, 1889, Manhattan; E. Bartholomew No. 292, on leaves, stems, and capsules, May 29, 1889, Rooks county; 755, on leaves, June 1, 1885, Manhattan; 1612, on leaves and stems, June 3, 1889, Manhattan; 1658, on capsules and stems, July 6, 1889, Manhattan.

On *Lepidium Virginicum* L.

1560, on leaves and stems, May 13, 1888.

This very abundant species is quite sensitive to moisture when brought into a dry room; the conidiophores rapidly twist 1–4 times around, and the conidia fall off and collapse. No mature oospores have as yet been found.

20. **Peronospora Potentillae** De Bary, in Ann. Sci. Nat., ser. 4, t. XX, p. 120. [Bot. Gaz., vol. VIII, p. 314; Syll., vol. VII, p. 253, No. 842.]

On leaves of *Rosaceae* June, not common.

On *Geum album* Gmelin.

1637, June 20, 1889, Manhattan; 1895, July 14, 1889, Manhattan.

On *Potentilla Norvegica* L.

1571, June 17, 1888, Manhattan.

In Sacc. Syll. l. c., Berlese and De Toni put this species in the *effusae*, but according to Farlow, Bot. Gaz. l. c., it should be in the *parasitae*. It is much more common on *Potentilla* than on *Geum*.

21. **Peronospora Cynoglossi** Burrill, in litt.; N. A. F., No. 2206. (Name only.)

"Conidiophores slender, about 6 to 8 times dichotomously branched, widely spreading, mostly somewhat flexuose; conidia subglobose to elliptical, with an apical papilla, pale violet, 13–19 by 15–24μ; oogonia thick-walled, brown, 40–50μ; oospores with thick, smooth, light-brown walls, 25–30μ. Forming (on Cynoglossum) large, prominent, indefinite patches on the under surface of leaves, of which the upper surface is yellowish, becoming dark-brown."

(Occurs on *Cynoglossum officinale* L., Illinois.]

Var. (?) **Echinospermi** Swingle, nov. var. Not causing definite spots, usually occupying nearly all of the upper leaves and also the stems of the plants attacked, forming a rather dense, dusky coating on the affected leaves; conidiophores very abundant, arising singly, or more often in groups of from 2 to 5, through the stomata, hyaline, erect, 4–6 times sub-dichotomously branched, but almost always with one branch much stouter and more erect than the other, 240–414μ (mostly 275–400μ) long, 8–12μ (mostly 9–11μ) diam. at base, the unbranched basal portion 183–330μ (mostly 200–280μ) long, sub-cylindrical tapering gradually above, suddenly somewhat narrowed at the base, sometimes slightly inflated just above the narrowed base, branches short, stout, divergent, primary ramifications 2–5 (mostly 3–4) times branched with only a short unbranched portion, ultimate branches short (5–16μ), rather stout, acute, straight or slightly curved, usually in unequal pairs arising nearly at right-angles, the smaller one often curving back slightly, the penultimate and ante-penultimate branches often somewhat curved, sub-squarrose; conidia at first light-colored, oval or elliptical, when mature oval, sub-globose, or rarely globose or elliptical, dusky or dull-brownish, very obtuse at both ends, not papillate, 21–34x15–30μ, mostly 23–33x17–28μ, very soon deciduous, wall thin, smooth, contents homogeneous or sparingly and irregularly granular; oospores not seen.

On leaves and stems of *Boragineae* June.

On *Echinospermum Redowskii* Lehm., var. *cupulatum* Gr.
E. Bartholomew No. 320, June 5, 1889, Rooks county.

Peronospora Cynoglossi Burrill is readily distinguished from *P. Myosotidis* De Bary and *P. Asperuginis* Schroeter, both of which occur on *Boragineae*, by the oospores having a smooth epispore, and the wall of the oogonium being thick. *P. Myosotidis* De Bary is said to have the epispore marked with reticulate ridges, and *P. Asperuginis* Schroeter has a warty epispore. The conidiophores of *P. Cynoglossi* Burrill, in N. A. F., 2206, (on *Cynoglossum Virginicum*, Tunnel Hill, Ills., May, 1882, A. B. Seymour,) are more rigid; the conidia are more violet and more clearly papillate than *P. Myosotidis* De Bary, in F. Eu. No. 572, (in Myosotidis intermediae foliis, Friburgi Brisgavorum, Aprilli, 1862, leg. De Bary.)

The Kansas specimen on *Echinospernum*, collected by Mr. E. Bartholomew, I have called *P. Cynoglossi* Burrill, var. (?) *Echinospermi* Swingle. This form may very likely prove to be new, but as no oospores have been found, the question cannot now be settled. Dr. Burrill (in letter) thinks the Kansas specimens are a form of his *P. Cynoglossi.* The conidiophores are, however, much less branched and more rigid; the conidia much larger and not papillate, though not much different in color. It is to be hoped that oospores of this interesting form can be found. Measurements of this form are given below:

MEASUREMENTS OF *PERONOSPORA CYNOGLOSSI* BURRILL, VAR. (?) *ECHINOSPERMI* SWINGLE, ALL GIVEN IN μ'S.

100 CONIDIA.*				25 CONIDIOPHORES.†				
				Total height.	*Length of unbranched basal portion.*	*Length of first branch.*	*Number of times branched.*‡	*Diameter at base.*
x15	25 x24	28 x22	30 x28	240	174	36	3–4	9
21 x15	25 x24	28 x23	31 x23	255	183	74	4–5	11½
21 x18	25 x24	28 x24	31 x23	261	195	66	4	8½
21 x20	25 x24	28 x24½	31 x23	270	210	54	4–5	10
21½x19	25 x25	28 x28	31 x23½	270	219	45	3–4	10
22 x18½	26 x20	28½x22½	31 x24	276	195	78	4	9
22 x22	26 x21	28½x25	31 x25	294	225	48	3–4	9
22 x22	26 x22½	29 x21½	31 x25	300	225	38	3–4	11
23 x18	26½x26	29 x22½	31 x26	306	252	69	2–5	11½
23 x20	27 x21	29 x23	31 x26	315	201	49	4–5	10½
23 x21	27 x22	29 x23	32 x23½	321	234	68	4	9½
23 x22½	27 x22½	29 x23	32 x24	324	240	78	4–5	10½
23 x23	27 x23	29 x24	32 x24	327	243	54	3–5	10
23½x18	27 x23	29 x24	32 x25	336	261	60	4	8½
24 x17	27 x23	29 x25	32 x25	348	270	60	3–5	10½
24 x17	27 x23	29 x25	32 x26	360	243	87	5–6	8
24 x20	27 x23	29 x25	32 x28	360	282	42	3–5	8½
24 x20	27 x23	29 x28	32½x23	366	270	75	4–5	12
24 x22	27 x24	30 x22	33 x26½	370	279	87	4–5	9
24 x23	27 x24	30 x23	33 x27	376	273	81	5–6	9
24 x23½	27 x24½	30 x23	33½x20	378	270	62	4–5	12
25 x19	27½x22½	30 x24	33½x30	390	310	76	5	9
25 x22	27½x22½	30 x25	34 x26	399	330	61	4–5	9½
25 x23	28 x18	30 x25½	34 x27	400	333	81	4–5	9½
25 x23½	28 x21½	30 x27	34 x27½	414	324	57	4–5	11½

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*Measured from dried specimens moistened with dilute Potassium hydrate, with eyepiece micrometer having divisions of a value of 1μ. †Measured from same slide as the conidia, with an eyepiece micrometer having divisions of a value of 3μ. ‡When two figures are given in this column, the first gives the number of bifurcations found by counting up the first branch of the conidiophore, and the second the number obtained by counting up the main stem of the conidiophore to the extreme tip. Rarely the number of branches was the same in both, and then only one number is given.

b Effusae, wall of oogonium thin, wrinkled at maturity; exospore thin, usually, with a few irregular folds.

22. **Peronospora Trifoliorum** DeBary, in Ann. Sci. Nat., ser. 4, t. XX, p. 117. Hedw., 1864, No. 9, p. 137. [Bot. Gaz., vol. VIII, p. 329; Syll., VII, p. 252, No. 841.]

Conidia and oospores on leaves of *Leguminosae Papilionaceae* May and June.

On *Astragalus Canadensis* L.

1624, with abundant nearly mature oospores, May 18, 1886, Manhattan; 1625, June 20, 1884, Manhattan.

On *Astragalus lotiflorus* Hook.

1606, June 18, 1888, Manhattan; 1628, June 29, 1889, Manhattan; 937, June 30, 1887, Manhattan; 1787, August 18, 1889, Manhattan.

It may be that the form on *Astragalus lotiflorus* is not the same as on *A. Canadensis*, as no oospores were found on the former. The conidiophores. and conidia, however, appear identical in both.

The oospores are quite different from those of *P. Viciae*, being almost smooth.

23. **Peronospora leptosperma** DeBary, in Ann. Sci. Nat., ser. 4, t. XX, p. 121. Hedw. 1864, No. 9, p. 139. [Bot. Gaz., vol. VIII, p. 331; Syll., vol. VII, p. 254, No. 847.]

Conidia and oospores on leaves of *Compositae Tubuliflorae* June and July.

On *Artemisia Ludoviciana* Nutt.

750, June 2, 1885, Manhattan; 1586, with a few nearly mature oospores, June 9, 1889, Manhattan; 1644, June 20, 1888, Manhattan; 1659, July 6, 1889, Manhattan.

24. **Peronospora alta** Fuckel. Fungi Rhenani Exs., No. 39; Symb. Myc., p. 71. [Bot. Gaz., vol. VIII, p. 328; Syll., vol. VII, p. 262, No. 879.]

Conidia and oospores on leaves of *Plantagineae* May and June.

On *Plantago major* L.

1578, May 14, 1887, Manhattan; 1523, May 22, 1886, Manhattan; 756, May 25, 1885. Manhattan; 1590, June 9, 1889, Manhattan; 1597, June 18, 1889, Manhattan; 1640, with nearly mature oospores, July 2, 1889, Manhattan.

25. **Peronospora candida** Fuckel, Fungi Rhenani Exs., No. 38 (1863); Symb. Myc., p. 71. PERONOSPORA ANAGALLIDIS Schroeter, in Rabenh. F. Eu., No. 1744 (1874); Hedwigia 1874, p. 45. PERONOSPORA ANDROSACES Niessl, in Rabenh. F. Eu., No. 1875 (1874). [Syll., vol. VII, p. 248 No. 828, p. 258 No. 860, p. 260 No. 869.]

Conidia and oospores on leaves of *Primulaceae* March to June; most common April and May.

On *Androsace occidentalis* Ph.

1572, on leaves of very young seedlings, March 24, 1889, Manhattan; 1649, on seedlings, March 31, 1889, Manhattan; 1664, with abundant nearly mature oospores, April 6, 1889, Manhattan; 1557, with oospores, April 16, 1888, Manhattan; 1555, with mature oospores, April 22, 1888, Manhattan; (Kansas Fungi No. 41), 1555; 1556, with very abundant mature oospores, June 22, 1888, Manhattan; 1573, on very small seedlings, December 24, 1888, Manhattan.

This abundant Kansas species seems to be the same as Fuckel's *P. Candida*, though I have no authentic specimens of it for comparison. It is, according to specimens in F. Eu., the same as *P. Anagallidis* Schroeter, of which Schroeter himself, in Just's Bot. Jahresb., 2 Jahrg. (1874), p. 209, says "wohl identisch mit *Per. cand.* Fuckel." It is the same as *P. candida* Fuckel in Roum. F. Sel. Exs., No. 4858, which is on *Anagallis coerulea*, and is evidently the same as *P. Anagallidis*, Schroeter. It also agrees fairly well with W. G. Smith's figure of *P. Candida* in The Gardener's Chronicle, vol. XXV, new series p. 695, (fig. 125.) Our species is certainly Niessl's *P. Androsaces* according to F. Eu., No. 3380. I have examined *P. Anagallidis* Schroeter, in Rabenh. F. Eu., Nos. 1744 and 1745, and *P. Androsaces* Niessl., in Rabenh Wint. F. Eu., No. 3380, and think they are certainly the same species as *P. Androsaces* Niessl., in Kell. & Sw. Kansas Fungi, No. 41. The conidiophores of the Kansas specimen are slightly stouter and perhaps less branched, and the conidia are slightly larger than in the European specimens mentioned. The oospores are larger but of the same character. The following measurements are given to show the differences between the specimens examined. The conidia in all are oval, ovate, or more rarely, sub-globose, and are slightly dusky. The oospores of all have a very thick, irregular epispore and thin oogonia, which collapse, probably adding to the apparent thickness of the epispore. The endospore (?) is somewhat variable in thickness. In optical section the oospores appear angular in most cases, but are sometimes nearly smooth. It should, I think, be placed in the sub-section *Effusae*.

MEASUREMENTS.*

PERONOSPORA ANDROSACES, F. EU. 3380.†

Conidia.	*Oospores including epispore.*	*Oospores without the epispore.*	*Thickness of endospore.(?)*
20x14½	36x31	27x26	3
20x14½	36x33	26x25	3
20x15	37x36	27x26½	3
20x15	39x32	26x26	3
20x16	39x34	29x27	3
21x18	42x35	24x23	3
22x15½	42x38	27x26	3
22x16½	42x39	27x27	3
22x17	45x42	28x27	3
23x18	48x44	27x26	4

PERONOSPORA ANAGALLIDIS, F. EU. 1744‡ AND 1745.§

Conidia.	*Oospores with epispore.*	*Oospores without epispore.*	*Thickness of endospore.(?)*
18x14	33x31	25x24	2
20x15	36x33	26x26	2
20x16	36x34	21x21	1½
20x16	36x36	25x24	2½
21x16	38x34	23x22	2
21x16	39x38	29x26½	1½
21x16	40x37	24x23	2½
21x17	41x40	26x24	1½
22x17	42x35	23x21	1½
24x18	45x36	24x24	2

PERONOSPORA ANDROSACES, KAN. FUNG. 41.‖

Conidia.	*Oospores with epispore.*	*Oospores without epispore.*	*Thickness of endospore.(?)*
21x15	36x36	27x26	2
21x16	40x39	31x30	3
21x16	41x38	32x29	2½
22x18	41x39	33x30	2½
23x17	42x34	33x31	3
23x18	42x36	30x29	2½
24x16	42x37	27x27	3
24x21	42x38	30x29	2½
25x18	45x42	30x30	2
25x19	48x45	33x32	2½

PERONOSPRA CANDIDA, ROUMEGUERE FUNGI SELECTI, EXS. NO. 4858.¶

Conidia.	*Oospores including epispore.*	*Oospores without the epispore.*	*Thickness of endospore.(?)*
21x16	27x27	20 x19	2½
21x18	30x27	21½x20	1½
22x16½	32x30	21 x20	2
22x17	35x30	22 x21	2
23x17	35x32	24 x23	2½
23x17	36x32	29 x25	2½
23x17	36x33	23 x22	2
24x18½	38x36	25 x25	3½
25x17½	40x35	24 x23	2½
26x19	40x40	28 x28	3

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* The conidia were in all cases mounted in very dilute KHO, and the oospores were mounted in water. The measurements were made with an eyepiece micrometer having divisions of a value of 3μ.

† "Suecia: prope Upsala. In foliis vivis Androsaces septentrionalis L., Mai, 1884, leg. C. J. Johanson."

‡ [Oospores] "Auf Anaggallis coerulea Schrb. Auf einem Acker bei Rastatt, im October und November, 1873. Dr. Schröter."

§ [Conidia] "An der untern Fläche lebender Blätter der Anagallis coerulea Schreb. Am Fusse der Weinberge hinter Unterissdorf bei Eisleben (Prov. Sachsen), August, 1873, leg. Johannes Kunze."

‖ "On *Androsace occidentalis* Ph. Manhattan, Kansas, April 22, 1888."

¶ "Sur les fenilles vivants de l'*Anagalis caerulea*. Dans un fossé desséché a Luchon (Haute-Garonne.) Ete 1888: *Ch. Fourcade.*"

26. **Peronospora grisea** Unger, in Bot. Zeit. 1847, p. 315. BOTRYTIS GRISEA Unger, Die Examtheme der Pflanzen, S. 172 (1833). [Bot. Gaz., vol. VIII, p. 330; Syll., vol. VII, p. 255, No. 852.]

On leaves of *Scrophulariaceae* May; not common.

On *Veronica peregrina* L.

1549, May 13, 1888, Manhattan.

27. **Peronospora Hedeomae** Kell. & Sw. n. sp. Not causing definite spots, usually occupying nearly all of the lower leaves of the plant (or portion of the plant) attacked, forming a rather sparse, dusky layer on the under surface of the leaves, or more rarely on the stems or floral-bracts. Conidiophores hyaline, erect, 4–9, mostly 5–8, times dichotomously branched, but almost always with somewhat unequal branches, 160–465μ long, mostly 225–390μ; 6–12μ, mostly 8–11μ diameter at base. The unbranched basal portion 80–240μ, mostly about 100–200μ long, nearly cylindrical or tapering above, abruptly narrowed at the base, sometimes once or even twice inflated at a short distance from the base; branches long, rather stout, somewhat spreading, primary ramifications straight, unbranched for a considerable distance; ultimate branches short (6–12μ), thick, sub-acute, slightly curved or straight, usually in unequal pairs arising nearly at right angles to each other, never forcipate; the penultimate and ante-penultimate branches often curved so as to be nearly parallel for some distance. Conidia at first globose hyaline, but when mature fuscous, obovate or obovate-elliptical, sometimes elliptical or oval, usually more acute at the base; not papillate, 21–32x13–22μ, mostly 24–30x14–17μ, very early deciduous; wall very thin, smooth, contents homogeneous. Oospores globose or sub-oval, nearly hyaline or of a slightly yellowish color, 22½–31μ diam., mostly 25–29μ diam.; epispore rather thin (2½–3μ), smooth, often marked with rather short hyaline elevations, contents finely and evenly granular, sometimes with a large central gutta; oogonia large, usually somewhat oval, 30–50x27–36μ, mostly 33–45x30–35μ, not fitting the oospores closely.

Oospores and conidia on leaves and stems of *Labiateae* February and May to June; most abundant in May.

On *Hedeoma hispida* Ph.

1576, on leaves, February 3, 1889, Manhattan; 1548, on leaves and stems, with young oospores, May 4, 1888, Manhattan; 1610, on leaves and stems, with a few oospores, May 18, 1889, Manhattan; 1550, on leaves and stems, with mature oospores, May 20, 1888, Manhattan; 1671, on leaves and stems, with immature oospores, May 20, 1889, Manhattan; 1613, on leaves and stems, with mature oospores, May 22, 1889, Manhattan; 1595, on leaves, with mature oospores, June 6, 1889, Manhattan; 1636, on leaves and stems, with a few oospores, June 18, 1888, Manhattan.

This species is rather abundant on plants about Manhattan. The diseased plants are stunted and become yellowish-green, or sometimes reddish-green. The afflicted leaves finally turn black, and usually fall to the ground, leaving the stems bare. It differs from *Peronospora Lamii* and *P. Swinglei* in the shape and size of the conidia, and from *P. Swinglei* in having much smaller oospores. It differs from *P. Lophanthi* in having stouter conidiophores, without forcipate tips, in the shape and size of the conidia, and in color of the oospores. All attempts to induce germination of the conidia failed.

MEASUREMENTS, ALL GIVEN IN μ'S.

100 CONIDIA.*				25 CONIDIOPHORES.†				
				Total height.	*Length of unbranched basal portion.*	*Length of first branch.*	*Number of times branched.*‡	*Diameter at base.*
21 x20	25 x15½	27 x14	29 x15	160	120	....	....	....
22 x14	25 x15½	27 x15	29 x15½	210	80	100	6–7	....
22 x14	25 x16	27 x15	29 x15½	210	105	75	4–5	6
22 x15	25 x16	27 x15	29 x17	225	110	....	....	....
22 x15½	25 x17	27 x16	29 x17	225	150	....	....	....
23 x15	25 x17	27 x16	29 x17	240	120	80	5–6	....
23 x15	25 x17½	27 x16	29 x19	240	140	....	....	....
23 x16	25½x14	27 x16	29 x20	245	150	105	5–6	8
23½x15	26 x15	27 x16½	29½x18	270	120	110	6–7	....
23½x16	26 x15	27 x17	30 x15	282	165	95	4–5	11
24 x14	26 x15	27 x17	30 x15	290	130	....	....	....
24 x14	26 x15	27 x17	30 x15	300	130	....	....	....
24 x14½	26 x15	27½x15	30 x16	310	195	....	....	....
24 x14½	26 x15½	27½x16½	30 x16	315	120	135	5–8	....
24 x15	26 x16	28 x15	30 x17½	320	190	....	....	....
24 x16	26 x16	28 x15	30 x18	330	159	110	5–7	12
24 x17	26 x17	28 x17½	30 x18	345	180	135	6–7	8
24½x14	26 x17	28 x19	30 x21	350	200	....	....	....
25 x14	26½x15	28 x20	31 x14	375	190	....	....	....
25 x14	26½x16	28 x20	31 x15	390	190	115	5–7	9
25 x14	26½x16	28½x16	31 x17	390	240	....	....	....
25 x15	26½x16	28½x16½	32 x15	395	240	....	....	....
25 x15	26½x16	28½x16½	32 x17	405	180	225	8–9	10
25 x15	26½x19	28½x17½	32 x19	435	240	....	....	....
25 x15	27 x13	28½x19	32 x22	465	240	....	....	....

* Measured from fresh specimens with an eyepiece micrometer having divisions of a value of 2½μ.
† Measured from same material and with the same micrometer as the Conidia. ‡ See foot-note on page 78.

25 OOSPORES.*

Diameter oospore.	*Thickness of wall.*	*Diameter oogonia.*	*Diameter oospore.*	*Thickness of wall.*	*Diameter oogonia.*
23x22½	2½	33x27	26½x25	2½	33x30
24x23	2½	42x33	26½x26½	3	35x34
25x25	2½	39x34	27 x26	2½	30x27
26x24	3	38x30	27 x26	3	40x35
26x25	2½	34x30	27 x26	2½	50x27
26x25	2½	35x33	27 x27	3	38x33
26x25	2½	36x34	28 x26½	2½	47x36
26x25	2½	37x33	29 x27	2½	36x32
26x25	2½	38x33	29 x27	2½	40x35
26x25	2½	38x34	30 x27	2½	50x35
26x25	2½	40x34	30 x30	2½	42x34
26x26	3	34x32	31 x30	2½	45x36
26x26	2½	40x35			

*Measured from fresh specimens with an eyepiece micrometer having divisions of a value of 2½μ.

28. **Peronospora Swinglei** E. & K., in Journal of Mycology, vol. III, p. 126. Conidia and oospores on leaves and stems of *Labiateae* May and June.

On *Salvia Lanceolata* Willd.

1618, with nearly mature oospores, on leaves and stems, May 26, 1889, Manhattan;

1542, (Coll. F. A. Waugh,) on leaves, June 14, 1887, McPherson county; 1617, with mature oospores, on leaves and stems, June 10, 1889, Manhattan; 910, June, 1887, Manhattan; (Exs. N. A. F., No. 2203, June, 1887, Manhattan); E. Bartholomew No. 333, on leaves, June 17, 1889, Rooks county; 1653, June 29, 1889, Manhattan; 1771, on leaves, August 14, 1889, Manhattan; 1774, on leaves, August 28, 1889, Manhattan (*Cercospora Salviae* Kell. & Sw., often occurs on same leaves).

I have compared this species with a specimen of *Peronospora Lamii* (Al. Br.) De By., on Lamium purpureum from Kreiger, Fungi Saxonici No. 195, sent to me by Mr. J. B. Ellis. The conidia in this specimen were very like those of *P. Swinglei*, but were not quite so dark colored. The conidiophores were more slender and more flexuose above; the ultimate branches were somewhat longer and narrower. The oospores were very scarce, but the few seen were much like those of *P. Swinglei*, except in size, being much smaller (about 25–33μ).

The oospores of *P. Swinglei* are globose or slightly oval, at first hyaline, but when mature dusky brown, variable in size, 29–45μ diam., mostly 33–39μ diam., wall rather thin, 2–4μ, irregularly roughened, often with several low ridges, contents irregularly granular; oogonia somewhat larger that the oospore, thin-walled, hyaline, collapsing, about 40–55μ diam.

It may very possibly be that *P. Swinglei* is only a synonym of *P. Lamii*, but until I have examined more specimens I cannot decide.

29. **Peronospora Effusa** (Grev.) Rabenh. Klotz Herb. Viv. Myc., No. 1880. BOTRYTIS EPIPHYLLA (?) Pers. Myc. Eur., p. 36 (1822); SPOROTRICHUM FARINOSUM (?) Link, Spec. Pt. I, p. 6 (1824); BOTRYTIS EFFUSA Greville, Flora Edinensis, p. 468 (1824); BOTRYTIS FARINOSA Fries, Syst. Myc., vol. III, p. 404 (1829); PERONOSPORA FARINOSA Fries, Sum. Veg. Scand., p. 493 (1849); MONOSPORIUM CHENOPODII Schlect. Bot. Zeit. 1852, p. 619; PERONOSPORA CHENOPODII Casp. Bot. Zeit. 1854, p. 565. [Bull. Bussey Inst., vol. I, p. 426; Bot. Gaz., vol. VIII, p. 327; Syll., vol. VII, p. 256, No. 854.]

On leaves of *Chenopodiaceae* May and June.

On *Chenopodium album* L., var. *viride*.

762, May 23, 1885, Manhattan; 895, May 28, 1887, Manhattan; E. Bartholomew No. 299, May 30, 1889, Rooks county; 1588, June 9, 1889, Manhattan; M. A. Carleton No. 52, June 16, 1887, Cloud county.

Mr. Bartholomew states that although it is more common on the variety *viride* of *Chenopodium album*, he has also seen it on the species, but did not collect any specimens.

Fries gives *Botrytis epiphylla* Pers. as a synonym of his *B. farinosa*, in Syst. Myc., vol. III, both on page 404 and in the index, on the strength of specimens, though, as he states, Persoon's description is faulty. Streinz, in Nomenclator Fungorum, p. 161, also gives *Botrytis epiphylla* Pers. as a synonym of *B. farinosa*, and does not indicate any doubt. Saccardo, in Syll., vol. IV, p. 118, says, after the description of *Botrytis epiphylla* Pers.: "An *Peronospora effusa* (Grev.) De Bary ?" There can be no doubt that *Botrytis farinosa* Fr. is the same as *Botrytis effusa* Grev., but if Persoon's name is used, it has priority of Greville's name by two years. The only fault in Persoon's description is that he says, "stipite simplice brevissimo," which could not be true unless he had stunted or broken specimens, which might have been the case.

30. **Peronospora Rumicis** Corda, Icones Fung. I, p. 20, t. 5, fig. 273. PERONOSPORA EFFUSA (Grev.) Rabenh., var. POLYGONI Thüm. Fungi Austriaci Exs. Nos. 942 and 836. PERONOSPORA POLYGONI Thüm., in Verhandlungen der K. K. Zoolog.-Bot. Gesell. in Wien, 1874. [Bot. Gaz., vol. VIII, p. 327; Syll., vol. VII, p. 257, No. 854.]

On leaves of *Polygonaceae*, July. Rare.

On *Polygonum dumetorum* L., var. *scandens* Gr.

1639, July 1, 1889, Manhattan; 1654, July 4, 1889, Zeandale, Riley county.

A comparison of *Peronospora Rumicis* Corda in Rabenhorst Fungi Europaei, Nos. 988 and 2677, with *Peronospora Polygoni* Thüm. in Ellis's North Am. Fungi, No. 1409, and with specimens from Iowa and Kansas, showed that there were no constant differences between Corda's *P. Rumicis* and Thümen's *P. Polygoni.* Specimens on *Polygonum aviculare*, collected by Mr. A. S. Hitchcock, at Iowa City, Iowa, were almost exactly like Fungi Europaei, No. 988, on *Rumex acetosella* from Germany. In Syll., vol. VII, p. 262, and Schroeter's Krypt. Flora Schles. III, p. 252, *Peronospora Rumicis* Corda is said to occur on species of *Polygonum.*

31. **Peronospora Euphorbiae** Fuckel, Fungi Rhenani Exs. No. 40; Symb. Myc., p. 71. [Bot. Gaz., vol. VIII, p. 330; Syll., vol. VII, p. 257, No. 855.]

Conidia and oospores on leaves, stems and inflorescences of *Euphorbiaceae*, August and September.

On *Euphorbia glyptosperma* Englm.

1873, with abundant mature oospores, on leaves, stems, and inflorescences, August 14, 1889, Manhattan; 1762, with nearly mature oospores, on leaves, stems, and inflorescences, August 18, 1889, Manhattan; 1667, with immature oospores, on leaves, stems, and inflorescences, August 19, 1889, St. George, Pottawatomie county.

On *Euphorbia hypericifolia* L.

1787, on leaves, August 11, 1889, Manhattan; 1791, on leaves, stems, and inflorescences, September 3, 1889, Manhattan.

On *Euphorbia maculata* L.

1770, on leaves, August 10, 1889, Manhattan; 1794, with nearly mature oospores, on leaves, stems, and inflorescences, August 18, 1889, Manhattan; 1786, with abundant immature oospores, on leaves, stems, and inflorescences, August 19, 1889, St. George, Pottawatomie county; 1645, on leaves, stems, and inflorescences, September 9, 1887, Manhattan.

On *Euphorbia serpens* HBK.

1869, on leaves, stems, and inflorescences, August 14, 1889, Manhattan; 1795, with immature oospores, on leaves, stems, and inflorescences, September 1, 1889, Manhattan; 1870, with abundant nearly mature oospores, but no conidia, on leaves, stems, and inflorescences, September 16, 1889, Manhattan.

This species is very abundant at Manhattan, and causes a distortion of the ends of the branches, which become of a yellowish color. This is, perhaps, our latest species to appear, as it has never been found until August.

c. Species of uncertain section, whose oospores are unknown.

32. **Peronospora Sordida** Berkeley, in Ann. Mag. Nat. Hist., 3d ser., vol. VII, p. 449. [Bot. Gaz., vol. VIII, p. 333; Syll., vol. VII, p. 262, No. 881.]

On leaves of *Scrophulariaceae*, May to September, and December.

On *Scrophularia nodosa* L.

562, May 15, 1885, Manhattan; 1663, June 25, 1884, Manhattan; 1642, July 2, 1889, Manhattan; 1789, August 11, 1889, Manhattan; 1799, September 1, 1889, Manhattan; 1901, September 26, 1889, Manhattan; 1608, December 1, 1888, Manhattan.

INDEX TO HOST PLANTS.

[Obs. Br. indicates *Bremia*, Cy. *Cystopus*, Per. *Peronospora*, Pl. *Plasmopara*, Scl. *Sclerospora*. The reference after each abbreviation of the generic name is to the serial number of the species in the list.]

- Amarantus .... Cy. 5
  - albus .... Cy. 5
  - blitoides .... Cy. 5
  - retroflexus .... Cy. 5
- Ambrosia .... Cy. 4, Pl. 10
  - artemisiaefolia .... Cy. 4, Pl. 10
  - psilostachya .... Cy. 4, Pl. 10
  - trifida .... Cy. 4, Pl. 10
- Androsace .... Per. 24
  - occidentalis .... Per. 25
- Artemisia .... Per. 23
  - Ludoviciana .... Per. 23
- Astragalus .... Per. 22
  - Canadensis .... Per. 22
  - lotiflorus .... Per. 22
- Bidens .... Pl. 10
  - connata .... Pl. 10
  - frondosa .... Pl. 10
- Brassica .... Cy. 1
  - nigra .... Cy. 1
- Capsella .... Cy. 1
  - Bursa-pastoris .... Cy. 1
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* VARIETIES.—These are arranged alphabetically, and give in parenthesis the damage on a scale of

LIST OF FAMILIES OF HOST PLANTS.

[Obs. The numbers and abbreviations indicate the same as in the preceding index. Bentham & Hooker's "Genera Plantarum" is followed for the sequence and names of the families.]

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100, and also the origin; æst. indicating that the variety was derived from *Vitis æstivalis*, Labr. from *Vitis Labrusca*, while hybr. means a hybrid and doubt. means doubtful.

Agawam (5) hybr.
Amber Queen (10) hybr.
Amminia (10) hybr.
August Giant (5) hybr.
Beauty (15) hybr.
Black Eagle (1) hybr.
Brant (1) hybr.
Brighton (25) hybr.
Catawba (20) Labr.
Centennial (20) hybr.
Concord (20) Labr.
Creveling (30) Labr.
Croton (20) hybr.
Delaware (40) hybr.
Diana (30) Labr.
Downing (40) hybr.
Dracut Amber (8) Labr.
Early Victor (8) Labr.
Eaton's Seedling (20) Labr.
El Dorado (1) hybr.
Etta (25) hybr.
Eumelan (15) æst.
Eva (8) hybr.
Faith (10) hybr.
Grein's Golden (15) hybr.
Hartford Prolific (2) Labr.
Highland (25) hybr.
Humboldt (15) hybr.
Iona (10) Labr.
Iowa Excelsior (20) hybr.
Isabella (10) Labr.
Ives (1) Labr.
Jefferson (20) hybr.
Jessica (8) doubt.
Lady (20) Labr.
Lenoir (10) æst.
Lindly (50) doubt.
Marion (20) hybr.
Martha (5) Labr.
Mason's Seedling (30) Labr.
Massasoit (25) hybr.
Maxatawney (10) Labr.
Merrimac (1) hybr.
Miles (10) Labr.
Moore's Diamond (25) doubt.
Montefiore (15) hybr.
Missouri Reisling (10) hybr.
Moyer (15) hybr.
Naomi (40) hybr.
Noah (5) hybr.
Norfolk (8) Labr.
Niagara (15) hybr.
Pearl (8) hybr.
Perkins (10) Labr.
Pocklington (10) Labr.
Potter's Sweet (15) hybr.
Prentiss (15) Labr.
Rebecca (20) Labr.
Rochester (40) doubt.
Salem (5) hybr.
Triumph (10) hybr.
Venango (5) Labr.
Vergennes (15) Labr.
Walter (25) hybr.
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AN ARTIFICIAL KEY TO THE KANSAS GRASSES.

BY W. A. KELLERMAN, PH. D.,
State Agricultural College.

[Descriptions of the species are given under corresponding numbers in "The Native Grasses of Kansas," published in the Report of the State Board of Agriculture for the Quarter ending March 31, 1889.]

Spikelets sessile on opposite sides of a jointed, or channeled rachis, forming a simple spike (1).
Spikelets not as above (5).

1. Spikelets single at each joint of the rachis (2).
1. Spikelets 2 or more at each joint of the rachis (3).

2. Spikelets one-flowered, partly immersed in the triangular rachis........ **30** SCHEDONNARDUS.
2. Spikelets many-flowered, placed edgewise on the rachis........ **52** LOLIUM.
2. Spikelets several-flowered, placed flatwise on the rachis........ **53** AGROPYRUM.

3. Outer glumes anterior, forming a sort of involucre (4).
3. Outer glumes none or 1-2 awn-like rudiments........ **56** ASPRELLA.

4. All the spikelets perfect and similar........ **55** ELYMUS.
4. Central spikelet of each cluster perfect and sessile, the two lateral short-stalked and sterile........ **54** HORDEUM.

5. Spikelets in a coriaceous, spiny involucre, or bur........ **7** CENCHRUS.
5. Spikelets capitate; small grasses, creeping or stoloniferous (6).
5. Spikelets not as above (7).